



Hemp as an Agricultural Commodity

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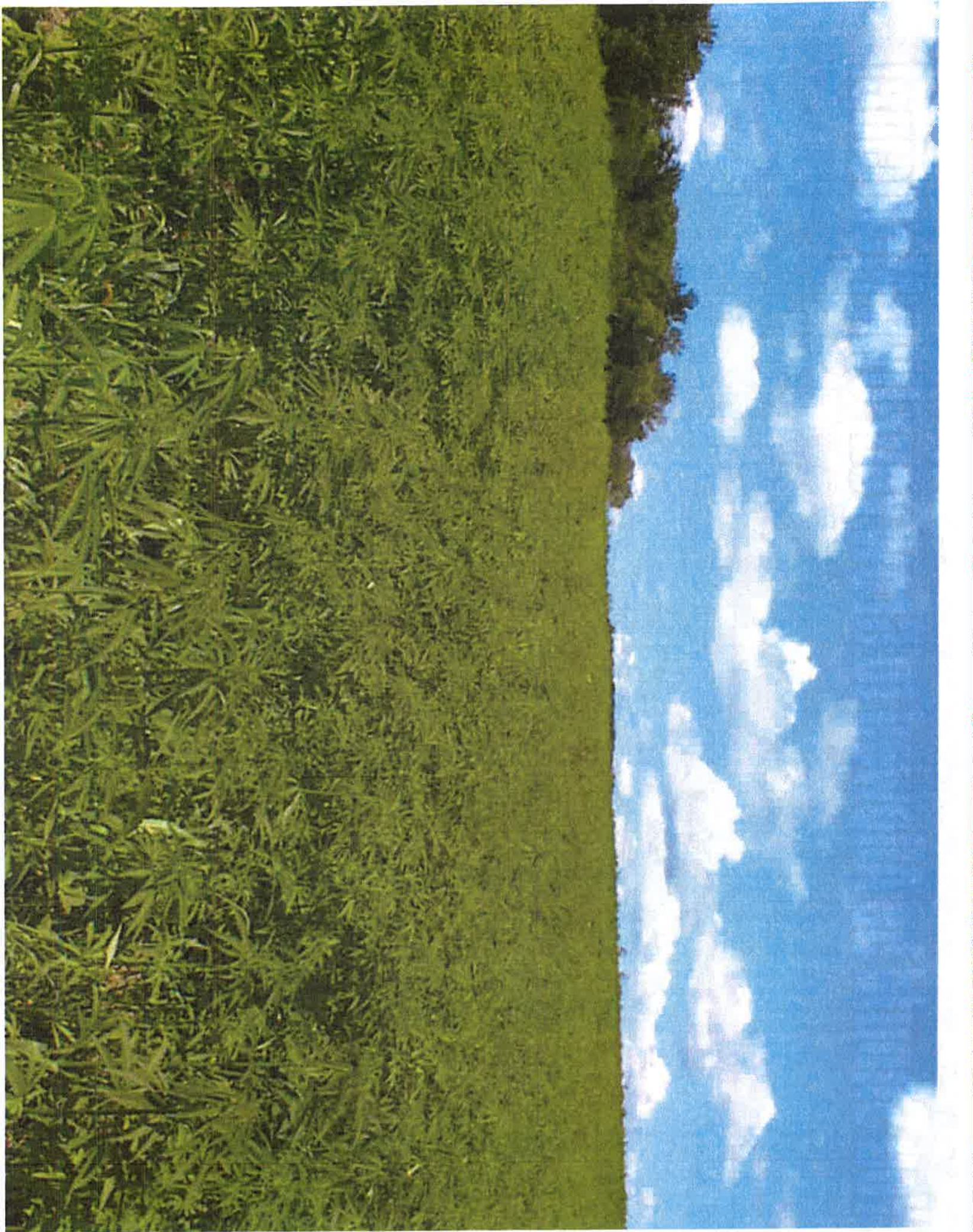
Summary

Industrial hemp is a variety of *Cannabis sativa* and is of the same plant species as marijuana. However, hemp is genetically different and distinguished by its use and chemical makeup. Hemp has long been cultivated for non-drug use in the production of industrial and other goods. Some estimate that the global market for hemp consists of more than 25,000 products. It can be grown as a fiber, seed, or other dual-purpose crop. Hemp fibers are used in a wide range of products, including fabrics and textiles, yarns and raw or processed spun fibers, paper, carpeting, home furnishings, construction and insulation materials, auto parts, and composites. The interior stalk (hurd) is used in various applications such as animal bedding, raw material inputs, low-quality papers, and composites. Hemp seed and oilcake are used in a range of foods and beverages, and can be an alternative food protein source. Oil from the crushed hemp seed is an ingredient in a range of body-care products and also nutritional supplements. Hemp seed is also used for industrial oils, cosmetics and personal care, and pharmaceuticals, among other composites.

Precise data are not available on the size of the U.S. market for hemp-based products. Current industry estimates report that U.S. retail sales of all hemp-based products may be nearly \$500 million per year. Because there is no commercial industrial hemp production in the United States, the U.S. market is largely dependent on imports, both as finished hemp-containing products and as ingredients for use in further processing. Under the current U.S. drug policy, all cannabis varieties, including hemp, are considered Schedule I controlled substances under the Controlled Substances Act (CSA, 21 U.S.C. §§801 *et seq.*; Title 21 CFR Part 1308.11). As such, while there are legitimate industrial uses, these are controlled and regulated by the U.S. Drug Enforcement Administration (DEA). Strictly speaking, the CSA does not make growing hemp illegal; rather, it places strict controls on its production and enforces standards governing the security conditions under which the crop must be grown, making it illegal to grow without a DEA permit. Currently, cannabis varieties may be legitimately grown for research purposes only. Among the concerns over changing current policies is how to allow for hemp production without undermining the agency's drug enforcement efforts and regulation of the production and distribution of marijuana.

In the early 1990s a sustained resurgence of interest in allowing commercial cultivation of industrial hemp began in the United States. Several states have conducted economic or market studies, and have initiated or passed legislation to expand state-level resources and production. Several states have legalized the cultivation and research of industrial hemp, including Colorado, Hawaii, Kentucky, Maine, Maryland, Montana, North Dakota, Oregon, Vermont, Washington, and West Virginia. However, because federal law still prohibits cultivation, a grower still must get permission from the DEA in order to grow hemp, or face the possibility of federal charges or property confiscation, despite having a state-issued permit.

The 113th Congress considered certain changes to U.S. policies regarding industrial hemp during the 2013 farm bill debate. The House-passed version of the farm bill (H.R. 2642, Section 6605) would allow certain research institutions to grow industrial hemp, if allowed under state laws where the institution is located. Similar provisions were not included in the Senate-passed farm bill (S. 947). Other introduced legislation, such as the Industrial Hemp Farming Act of 2013 (H.R. 525; S. 359), could allow for possible commercial cultivation of industrial hemp in the United States. Those bills would amend the CSA to specify that the term "marijuana" does not include industrial hemp, which the bill would define based on its content of delta-9 tetrahydrocannabinol (THC), marijuana's primary psychoactive chemical. Such a change could remove low-THC hemp from being covered by the CSA as a controlled substance and subject to DEA regulation.



You Should be Allowed to Grow your Own Medicine!

Every single one of us!



Colorado

Industrial Hemp Remediation Pilot Program

The health of our communities and future generations can be improved by implementing a hemp phytoremediation program. This has a positive contribution to the economic potentials of today through local economic stimulation.

Why Phytoremediation?

- Phytoremediation costs 5% to 10% vs. Landfill costs
- 90% reduction in waste volume
- 90% to 95% reduction in metals from water
- Less Surface Disturbance

Why Hemp?

- Low Water Use (12"-15" per year)
- Low to Zero Fertilizer Requirements
- Hemp Kills Noxious Weeds
- High Metals Uptake
- High Survival Tolerance for Existing Contaminants
- Erosion Mitigation
- More Studies Needed

The Pilot Program would specifically:

- Create a set of data that would determine the effective remediation capacities of hemp
- Demonstrate that hemp can aid in improving soil conditions for the production of food crops
- Demonstrate the economic potentials for using hemp in remediation projects
- Demonstrate that hemp can remediate contaminants from water

Economic Potentials of the pilot program:

- Increase the usable land area for agriculture; restore proper pH balance in the soil and water
- Improved hunting, bird watching and fishing habitats
- Flood attenuation (US\$ 772/ per acre)
- Industrial and domestic wastewater treatment (US\$ 265/ per acre per year).
- CO₂ Sequestering: (a damage cost of US\$ 10 per ton of carbon per year)
- H₂O remediation of pharmaceutical contamination

HB12-1099

Colorado

Industrial Hemp Remediation Pilot Program

Background

Farming in America over the past few hundred years has significantly reduced the viability of the available soil for raising crops. Numerous physical, chemical and biological changes over the years have reduced the productive capabilities of these lands. These soils can be made more pristine through a rapidly growing industry of phytoremediation, another expanding Biotech industry.

Over the last two decades, remediation techniques for serious environmental pollution has attracted considerable attention. Many different processes have been employed for effective remediation of contaminated soil and water, including biological and chemical processes. The nature of soil contamination, location of the site, time required, and costs will determine what strategy is employed in any specific area.

Non-drug hemp is a plant that shows a large potential for its function as a phytoremediator. This study will assemble the data necessary to determine what parameters non-drug hemp will perform within for this application. Non-drug hemp is a viable plant to study due to its very strong tap root system and the depth of which it goes into the soil, one of the factors to consider when determining the depth of the required remediation.

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Other factors are rate of absorption, the range of growing requirements, the ability of the non-drug hemp plant to continue growing while absorbing numerous substances from the soil and water. The substances which non-drug hemp may mitigate include, but are not limited to heavy metals such as lead or mercury, dyes, pesticides, pharmaceuticals and excessive nutrients. These accumulated issues have lead to fish kills, loss of biodiversity, and has rendered water unfit for drinking and other agricultural or industrial uses in ever expanding areas. (1)

Using plants as a remediation method reduces costs and environmental impact to remediation sites. The economics, restrictions and benefits of phytoremediation have been thoroughly researched. (2) Recently, there has been a focus on soil and atmospheric pollutants. (3) non-drug hemp has been shown to bind organic compound contaminants from the air and soil. Non-drug hemp grows well in many types of soil conditions and is water efficient, which makes it an ideal plant for Colorado.

Potential Sites

Target areas include farmland, mine dumps, and mill tailings. Other sites may include land fills, sludge and effluent runoff from agricultural, industrial and municipal waste areas could also be potential program areas.

Economics

The scaling of the project will allow for flexibility of the programs funding. Farmers, consumers and business will benefit in a multitude of ways. As the project matures, the potential for economic return will increase due to the rejuvenation of the soil and water. Specific economic benefits from this project are an increase the usable land area for agriculture, improved hunting, bird watching and fishing habitats,

flood attenuation, wastewater treatment, and CO₂ sequestering. This also has positive implications to The Economics of Ecosystems and Biodiversity (TEEB), which demonstrates the value of ecosystems and biodiversity to the economy, to society and to individuals. To achieve the maximum benefit from this pilot program, it is in the best interest of the government, academia and businesses to work together to achieve these goals. The chart below are seven values that come out of the ecosystem.

Phase One

To address the cost, safety, security of this phase of the pilot project, the testing and cultivation of samples will be located in an indoor grow facility. The initial stages require multitudes of testing scenarios and controls of all aspects to formulate a baseline set of data.

Phase Two

This is where the pilot program is taken outdoors to a larger scale of implementation of specific results from Phase One, ranging from 1-500 acres.

Disposal

After a season of non-drug hemp is cultivated, the materials of the plant, leaves, stalk, and seed, are to be disposed of in a controlled and secure manner. This is an additional economic opportunity for the local economy.

Evaluation

The data collected from the non-drug hemp remediation pilot program will help determine the

economic impact of the changes in the ecosystem and their benefit. With the policy change of researching non-drug hemp and its impact on the ecosystem, the changes in ecosystem services and thus the impacts on human welfare will determine the programs effectiveness. Included below is a graph showing seven ecosystem services that are impacted. (fig 1)

Legal

States Rights and the Tenth Amendment The Tenth Amendment states the Constitution's principle of federalism by providing that powers not granted to the federal government nor prohibited to the States by the Constitution are reserved to the States or the people.

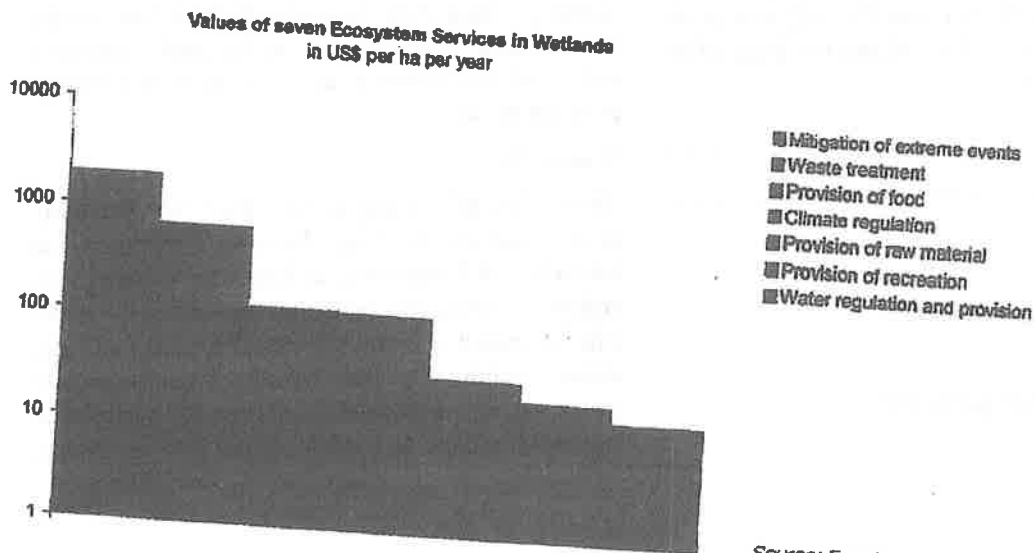
On the Federal level, the legal issues with the DEA could be resolved with the signature of the president, as an administrative rule change.

Article 28, of the Single Convention on Narcotic Drugs of 1961, as amended by the 1972 Protocol, states that, "This Convention shall not apply to the cultivation of cannabis plant exclusively for industrial purposes (fiber and seed) or horticultural purposes."

(1) Carpenter, S.R., N.F. Caraco, D.L. Correll, R.W. Howarth, A.N. Sharpley, and V.H. Smith. 1998. "Nonpoint Pollution of Surface Waters with Phosphorus and Nitrogen". *Ecological Applications* 8:559-568.

(2) Cunningham et al. 1995; Pletsch et al. 1999; Burken et al. 2000; Macek et al. 2000)

(3) Salt et al. 1998



Source: Emerton and Kekulandala 2003